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CONSEQUENCES OF SEPARATION INCENTIVES: THE EFFECTS OF VSP AND TERA ON THE MARINE CORPS AVIATION COMMUNITY

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THESIS

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by

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March 2019

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In 2013 the Marine Corps began to reduce end-strength from 202,000 to 182,000. To facilitate the force reduction of mid-careerists, the Marine Corps offered Voluntary Separation Pay (VSP) and Temporary Early Retirement Authority (TERA). This thesis examines the efficiency of these two programs across Naval Aviator and Naval Flight Officer (NFO) Military Occupational Specialties (MOS). VSP targeted Marine Majors and Major (selects) with 10 to 15 years of service, providing eligible Marines with a lump-sum payment based on rank and years of service. TERA targeted Marines with greater than 15 years of service with a reduced retirement pension compared to if those Marines had serviced to 20 years.

The analysis shows that VSP and TERA worked as intended, accounting for 255 separations—more than a year's worth in the steady state—among Marine pilots and NFOs between 2013 and 2016. While Marine pilots and NFOs with skill-specific qualifications such as Weapons and Tactics Instructor and Forward Air Controller have a negative probability of taking VSP or TERA, general demographics such as gender, race, and marital status appear to have no effect on take-up of VSP or TERA. However, VSP and TERA affects the quality of those remaining in the Corps. While TERA incentivizes low-quality Marines to separate, VSP appears to incentivize high-quality Marine pilots and NFOs to separate.

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LIST OF ACRONYMS AND ABBREVIATIONS

ACIP	Aviation Career Incentive Pay
ACOL	Annual Cost of Leaving
ACP	Aviation Continuation Pay
AFQT	Armed Forces Qualifications Test
AMOS	Additional Military Occupational Specialty
AvB	Aviation Bonus
CD	Career Designation
DiD	Difference-in-Difference
DRM	Dynamic Retention Model
FITREP	Fitness Report
FTAP	First Term Alignment Program
FW	Fixed Wing
MOS	Military Occupational Specialty
MRO	Marine Reported On
NFO	Naval Flight Officer
PCA	Permanent Change of Assignment
PCS	Permanent Change of Station
PMOS	Primary Military Occupational Specialty
RO	Reviewing Officer
RS	Reporting Senior
RV	Relative Value
RW	Rotary Wing
STAP	Subsequent Term Alignment Program
TIG	Time-in-Grade
TERA	Temporary Early Retirement Authority
VSP	Voluntary Separation Pay

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I. EXECUTIVE SUMMARY

A. BACKGROUND

After the end of the Global War on Terror, the Department of Defense (DoD) faced a significant downsizing problem. The Marine Corps needed to reduce its end-strength from 202,000 to 182,100. The Marine Corps faced end-strength reductions after every major conflict since World War II, including the 1990s Post-Cold War draw down. Some of the lessons from the 1990s drawdown were "avoid excessive accession cuts, maintain FTAP/STAP retention goals, maintain promotion flow points, and inventory must be reduced in all ranks" (Tosick, 2012). This means the Marine Corps needed to reduce numbers across the force instead of just recruiting less and ending up with an older force.

There are two basic ways to trim down manpower in the Marine Corps: reduce recruiting and increase attrition. To prevent a hollowed force structure and use the lessons learned from the 1990s drawdown, the Marine Corps must use both methods in coordination. Decreasing recruiting and re-enlistments among first-term Marines is relatively easy—planning the recruiting and re-enlistment numbers is not easy and is also outside the scope of this study. However, when Marines have over 10 years of service, retention rates approach 100 percent due to a high affinity for military service and the cliff vesting style of the military retirement system. To incentivize the separation of Marine officers who were Majors or Major(select) or had greater than 15 years of service, the Marine Corps offered Temporary Early Retirement Authority (TERA) and Voluntary Separation Pay (VSP).

My thesis evaluates the impacts of VSP and TERA on the Marine Corps Aviation Officer population during the 2013–2016 drawdown. In particular, I examine who took up VSP and TERA, and the examine differences in characteristics of those that separated under VSP and TERA relative to the overall and eligible populations. I also examine the consequences of these programs on the quality remaining in the aviation community, implying the possible tradeoffs in the quantity and quality of these separations.

1. Marine Corps Aviation Community

While the aviation community is a small part of the Marine Corps, it swelled significantly when the Marine Corps increased end-strength to support wars in both Iraq and Afghanistan and thus needed to reduce its size as part of the drawdown effort. From 2010 to 2012 the Marine Corps, DoD, and Congress were still determining the optimum size of the force (Freichert 2014). The 2010 Marine Corps Force Structure Review Group recommended the Marine Corps reduce the number of squadrons from 70 to 61 as part of a drawdown plan to reduce end strength to 186,800. Also, there were discussions of reducing the Marine Corps manpower even lower to 175,000. In 2012, at the height of the plus-up, the Marine Corps had 70 flying squadrons but decreased that number to 64 by 2017.

The aviation community is also a very specialized community within the Marine Corps. Their qualifications afford them high paying jobs outside the Marine Corps, which normally requires the Marine Corps to provide pilot and NFO bonuses to meet retention goals. Pilot and NFO response to monetary incentives to separate creates an interesting studying since usually the Marine Corps gives them money to stay.

2. Separation Incentives

To achieve a drawdown from 2013 to 2016, the Marine Corps began to introduce its drawdown programs to Marines in 2012. VSP and TERA were two of many force shaping tools the Marine Corps used during the drawdown. Other measures included Early Discharge Authority, Selective Early Retirement Board, and Time-in-Grade (TIG) Waivers, but VSP and TERA were the main programs with monetary incentives. Marines were told VSP and TERA would be offered to overstaffed MOSs, and the Marine Corps would only use involuntary separation means on Majors and above in the officer corps as a last resort (Tosick 2012).

Marine officers eligible for VSP received a lump sum equal to 20 percent times their annual basic pay times their years of service (MARADMIN 541/12). For a Major with 12 years of service in 2013, VSP was a taxable lump sum payment of $194,064. Marine officers eligible for TERA received a monthly retirement payment using the standard 2.5

percent multiplier but with a 1 percent reduction per number of years of service less than 20 (MARADMIN 543/12). In this case, a Major with 16 years of service would receive a retirement annuity equal to 36 percent of his/her high three base pay ((16 X 2.5 percent) – (20 – 16) = 36 percent).

Calculations for VSP and TERA monetary incentives were consistent each year they were available and across eligible MOSs; however, MOS eligibility changed each year. Table 1 displays the Marine Aviation MOSs eligible for VSP and TERA from FY2013 to FY2016. MV-22 and F-35 pilot MOSs were the only Marine pilot MOSs not offered VSP and TERA during the drawdown.

Table 1. VSP and TERA Eligibility across Marine Aviation MOSs

MOS Code	**MOS Title**	**2013**			**2014**			**2015**			**2016**		
		VSP	TERA	ACP Wavier	VSP	TERA	ACP Wavier	VSP	TERA	ACP Wavier	VSP	TERA	ACP Wavier
7509	AV-8B Pilot				X	X		X	X	X			
7518	F-35 Pilot												
7523	F/A-18 Pilot				X	X							
7525	F/A-18D WSO				X	X		X	X	X			
7532	MV-22 Pilot												
7543	EA-6B Pilot				X	X							
7556/57	KC-130 Co-Pilot/ AC				X	X		X	X	X			
7562	CH-46 Pilot	X	X	X	X	X	X	X	X	X		X	X
7563	UH-1 Pilot				X	X		X	X	X			
7564/66	CH-53 Pilot				X	X		X	X	X		X	X
7565	AH-1 Pilot				X	X		X	X	X			
7588	EA-6B ECMO				X	X							

Adapted from MARADMIN 541/12, 543/12, 155/13, 156/13, 154/14, 155/14, 270/15.

Moreover, a waiver for Aviation Continuation Pay (ACP) was an additional incentive offered by the Marine Corps. ACP is a bonus the Marine Corps offers to certain pilot and NFO MOSs once the pilots and NFOs have completed their initial obligated service, which is eight years for pilots and six years for NFOs. ACP MOS eligibility and bonus amount changes each year. Pilots and NFOs are usually offered short-term and long-term ACP contracts. Short-term ACP contracts keep individuals in the Marine Corps until 13 Years Commissioned Service (YCS) and long-term contracts are to keep individuals for 15 YCS (MARADMIN 0637/09). The Marine Corps stopped the ACP program in FY 2010 and started a new Aviation Bonus (AvB) Program in FY 2018 that is significantly different than ACP (MARADMIN 614/17).

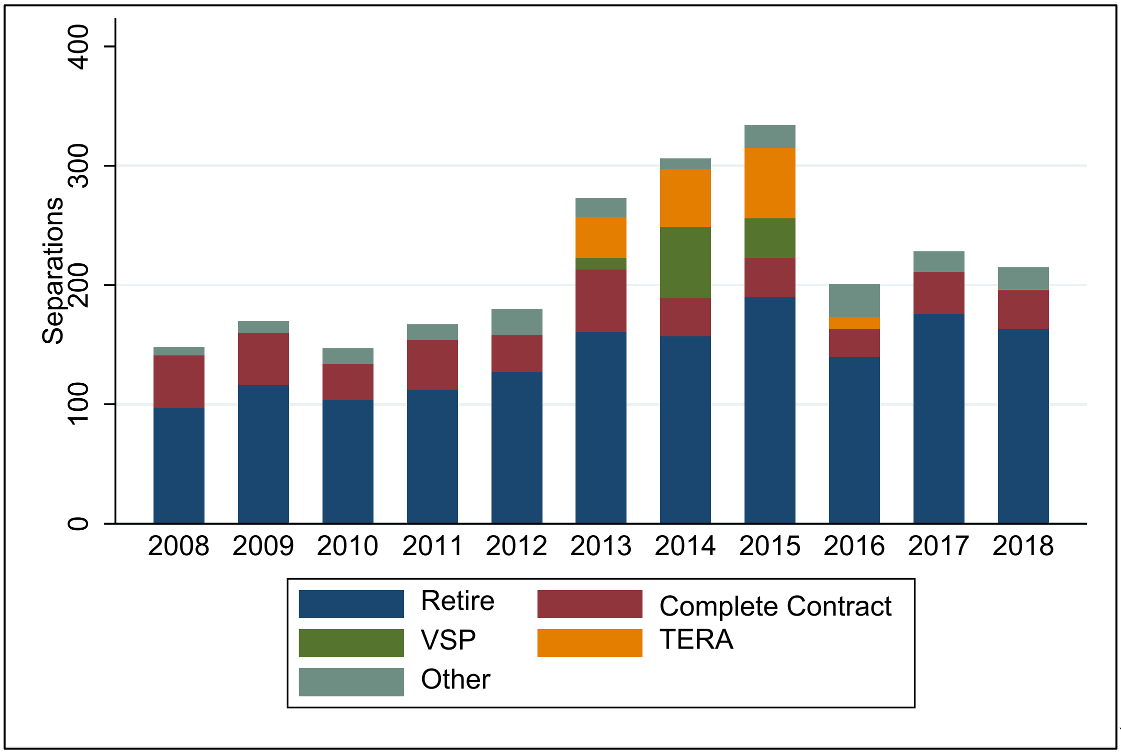
Initially, the ACP waiver was only offered to CH-46 pilots, but in FY2015 the Marine Corps offered ACP waivers to any MOS eligible for VSP and TERA. Finally, the Marine Corps broadened the eligibility criteria for TERA by reducing the years commissioned service necessary to retire from ten to eight during the draw down (MARADMIN 619/11). They also allowed any Captains or Major not selected for the next rank to be eligible for TERA regardless of MOS as long as they met the other requirements—between 15 and 20 years of service, greater than 8 years of commissioned service, etc. (MARADMIN 543/12).

Decommissioning platforms such as the CH-46 added to the complexity of the 2013 to 2016 drawdown because some of their pilots transitioned to the MV-22, which was not eligible for VSP or TERA. The Marine Corps had to build two new aviation communities, for the MV-22 and F-35 platforms, while simultaneously reducing its overall force structure. The Marine Corps built the MV-22 and F-35 communities through initial accessions from flight school and transitions from other platforms. VSP and TERA were blanket incentives and did not have a multiple to incentivize particular overstaffed MOSs relative to others. In light of this, I hypothesize VSP and TERA had differential effects across the aviation community, and may not have led to the most efficient drawdown in the Marine Corps across MOSs.

B. RESULTS AND CONCLUSIONS

VSP and TERA increased separations—as intended—during the drawdown as shown in Figure 1. The program worked.

Figure 1. Marine Pilot and NFO Separations by Fiscal Year



When combining VSP and TERA separations, 255 Marine pilots and NFOs separated through the programs and amounted to over an additional year's worth of separations between 2013 and 2016. Probit models show demographic characteristics such as gender, race, ethnicity, and marital status do not statistically significantly change the probability of taking VSP or TERA. With the exception of the CH-46 MOS, Marines had relatively similar taker probabilities within their respective FW pilot, RW pilot, and NFO MOS group. Finally, individuals with Marine specific training such as WTI, ASO, and FAC/AO show a lower probability of taking VSP and TERA. Since the Marine Corps spends a large amount of money to train WTIs, ASOs, and FAC/AOs, it is positive to see those Marines have a statistically higher probability of staying in the Marine Corps despite the incentives to leave.

Turning to quality, I use job performance evaluation scores on the FITREP to measure quality of Marine pilots and NFOs. VSP and TERA takers have wider Reporting

Senior (RS) FITREP distributions (higher variance) than those that stayed or separated by another means. The quality of Marine pilots and NFOs separating also significantly differ depending whether they took VSP or TERA. VSP incentivizes high-quality Marine pilots and NFOs to separate while TERA appears to have done the opposite. Figures 2 and 3 show a relatively greater proportion of high quality officers as measured by RS and RO marks that took VSP. Conversely, TERA takers are more likely to be lower quality, although a small amount of high-quality Marine pilots and NFOs did take TERA.

Figure 2. Kernel Densities for Avg RS RV – Cumulative

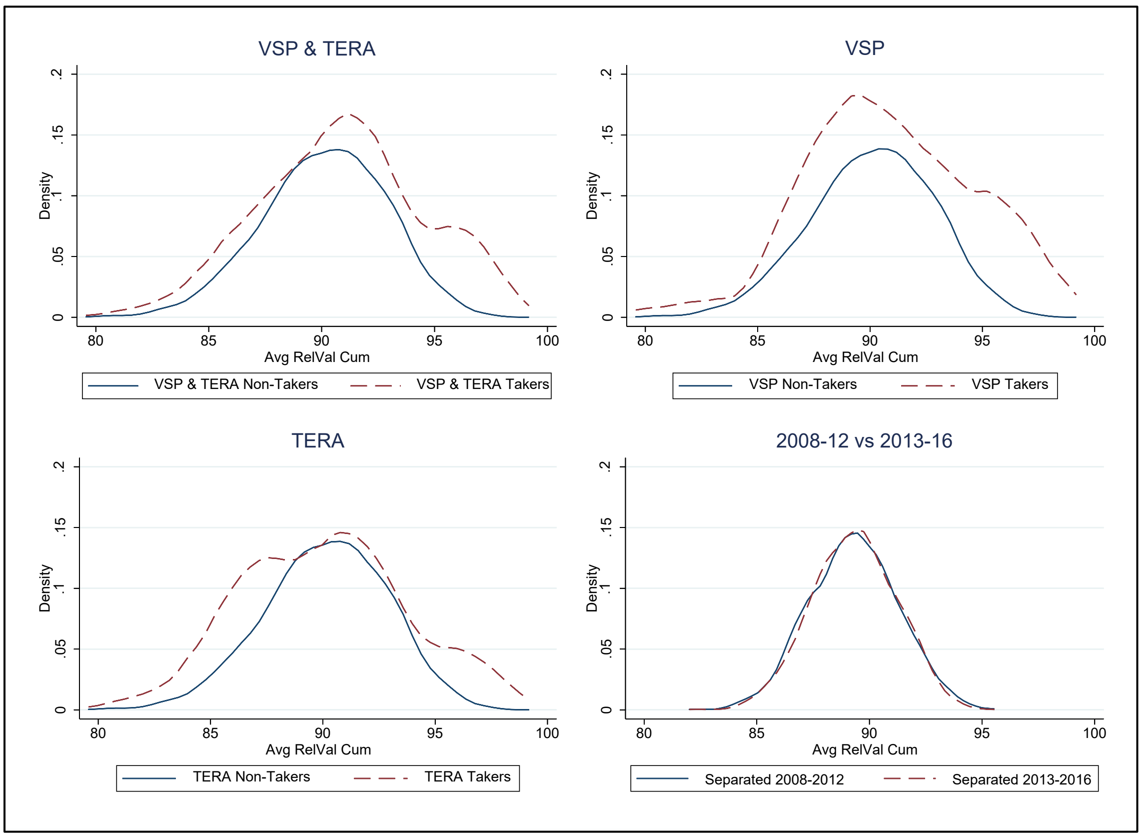
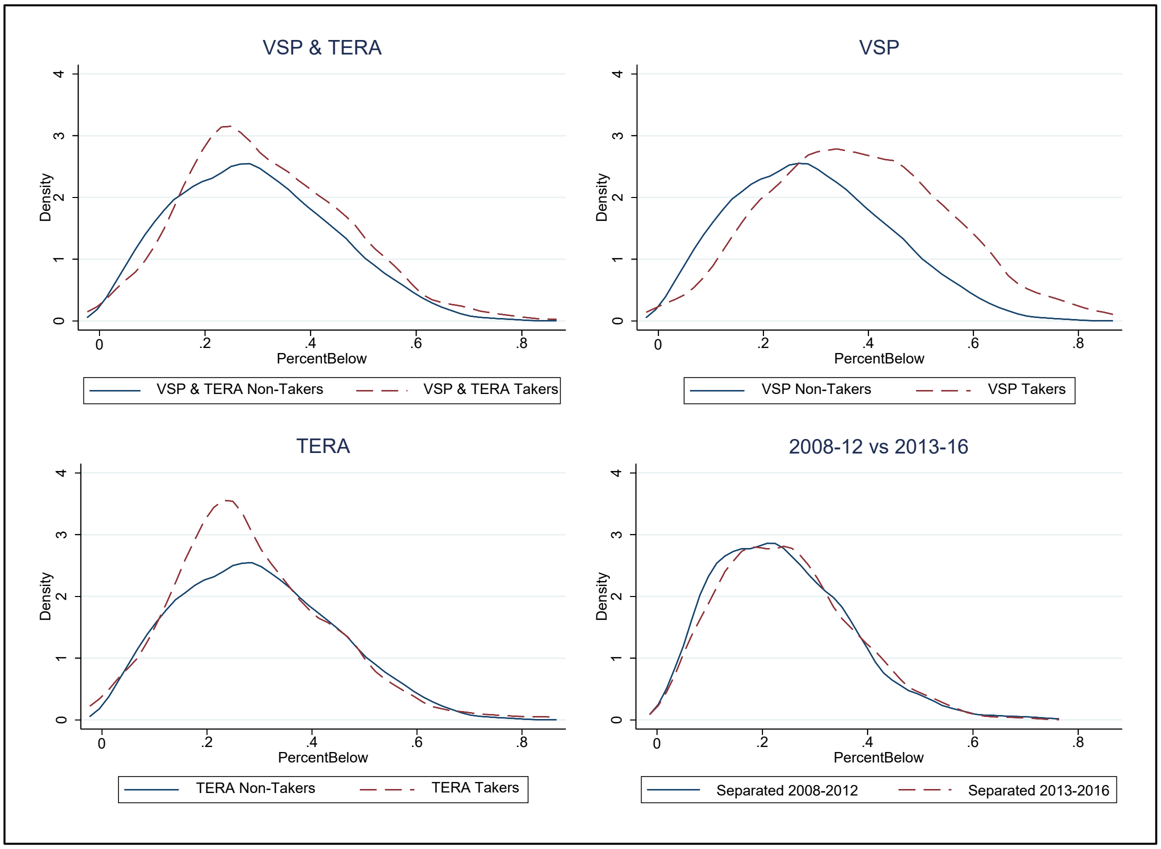


Figure 3. Kernel Densities for RO Percent Below



Since high-quality Marine pilots and NFOs have a higher probability to separate under the VSP program, the Marine Corps should consider a quality adjustment offer for future separation pay incentive programs.

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II. LITERATURE REVIEW

Workforce reductions are challenging for any organization, military or civilian. Choosing whom to layoff or buyout, and when, are the toughest questions organizations face during downsizing. At the end of the Global War on Terror, the Marine Corps faced a reduction of 20,000 Marines over four years (Tosick, 2012). The DoD uses retention models to predict end-strength over a given period of time. Usually the models determine which MOSs require retention bonuses to meet manpower goals; however, in the case of a drawdown the models are used to determine the size of the buyout necessary to meet manpower constraints imposed onto the military.

A. RETENTION MODELS

Retention models are used by the DoD to determine the effects of pay (basic pay, BAH, retention bonus, etc.) on retention. The DoD has used various models throughout history based on data and computing power available.

1. Annual-Cost-of-Leaving (ACOL) Model

The ACOL model is one of the first retention models used to empirically analyze how differences between military and civilian pay affected retention (Asch, Hosek, & Warner, 2007, p. 1091). The ACOL model assumes individuals weigh their current and future pay in the military versus potential civilian employment. The greater the ACOL the more likely a service member is going to stay in the military. The models use cross-sectional data to obtain estimates and contain many variables regularly associated with retention including reenlistment bonus, unemployment rate, AFQT, race, ethnicity, gender, and marital status.

The ACOL model has many downsides in its estimations, however. Comparing military and civilian compensation is difficult because while future military compensation is relatively easy to calculate, future civilian compensation is much more complex. ACOL is designed to estimate retention in the current period and cannot estimate retention at future retention periods (e.g., reenlistment periods or additional PCS/PCA periods for officers). Additionally, ACOL does not account for nonpecuniary items such as an individuals' preference for military service over the civilian workforce. It is assumed the individual will leave the service if the present or a future ACOL value is less than their preference for military service.

2. Annual Cost of Leaving-2

ACOL-2 was developed due to ACOL's inability to estimate multiple periods and preference for military service (Asch, Hosek, & Warner, 2007, p. 1092). ACOL-2 uses panel data to estimate service members' preference for military service by measuring reenlistment decisions over time. Members that continue to reenlist are determined to have a higher preference for military service and their preference variable adjusts in the ACOL-2 model unlike the ACOL model.

3. Dynamic Retention Model (DRM)

The RAND corporation developed the DRM in the 1980s to determine retention rates among Air Force officers (Asch et al., 2007, p. 1092). DRM has the same basic concept of any retention model where service members compare their present and future earnings potential in the military to the civilian market; however, DRM differs most significantly from ACOL models in that DRM is able to determine the service member's decision to stay or leave the military across time by allowing their preference for military service to adjust dynamically.

DRM contains complex computation methods; therefore, its use is relatively low compared to ACOL. A benefit of DRM's ability to estimate future periods is its applicability to career incentive pays that pay over multiple years (e.g., ACP or AvB). ACOL was only able to evaluate the following year's retention while DRM can determine the effect of a five-year ACP.

4. Retention Model Evaluation

All retention models suffer from the same set of issues. First, retention models have assumptions (e.g., civilian earnings potential) built into them to produce retention estimates. If these assumptions turn out to be wrong, the models' estimates may be wrong.

Second, the method of supplying bonuses is not a randomized process and therefor is subject to reverse causality. Services will give or increase bonuses to critical MOSs with low reenlistment rates and eliminate or reduce bonuses to MOSs with adequate supply. Direct causality is displayed by an increase in reenlistment rates after an increase in SRBs. This is a positive effect. Reverse causality is displayed by a service increasing SRBs because of low reenlistment rates. This is an example of negative reverse causality. The problem with reverse causality in retention models is that it is impossible to calculate and isolate the direct effect of SRBs.

B. POST-COLD WAR DRAWDOWN

In the 1990s the DoD faced a significant drawdown of around 400,000 service members amounting to approximately 25 percent of the force (Warner & Pleeter, 2001). The DoD has multiple avenues to reduce manpower; reduce recruiting and reenlistments, offer incentives for service members to leave voluntarily, and force individuals to leave involuntary. This study focuses on the incentives provided for service members to leave voluntarily. The DoD needed to provide separation incentives to mid-careerist since individuals with over 10 years of service have close to a 100 percent reenlistment rate due to a high preference for military service and the cliff vesting style of the military retirement system (Mehay & Hogan, 1998).

1. Payment Incentives

Each military branch offered the same two types of voluntary payment incentives, Special Separation Bonus (SSB) and Voluntary Separation Incentive (VSI) that affected approximately 65,000 service members. SSB offered service members a lump sum payment equal to 15% of their annual base pay times years of service. VSI provided an annual annuity equal to 2.5% of annual base pay multiplied by years of service for twice the number of years of service (Mehay & Hogan, 1998). VSI was similar to retirement although it was not index for inflation (Warner & Pleeter, 2001). Table 1 shows a comparison of SSB and the present value of VSI at various discount rates for officers and enlisted at different points in their careers.

Table 2. VSI and SSB Benefits, Selected Examples

	Lump-sum Amount	Annuity Amount	Present Value of Annuity 7 percent	10 percent	20 percent	30 percent	Break-even discount rate	Percent lump sum
Officer								
O-3 with 7 YOS	$34,709	$5,785	$54,129	$46,875	$32,002	$24,430	0.175	70.7
O-3 with 9 YOS	$46,219	$7,703	$82,908	$69,497	$44,485	$33,085	0.189	52.1
O-4 with 12 YOS	$72,006	$12,001	$147,276	$118,005	$71,106	$51,904	0.196	36.2
O-4 with 15 YOS	$94,114	$15,686	$208,274	$162,645	$93,722	$67,950	0.198	29.8
Enlisted								
E-5 with 7 YOS	$16,655	$2,776	$25,973	$22,492	$15,356	$11,722	0.175	95.1
E-5 with 9 YOS	$22,283	$3,714	$39,972	$33,506	$21,447	$15,951	0.189	94.8
E-6 with 12 YOS	$35,549	$5,925	$72,710	$58,259	$35,105	$25,625	0.196	88.1
E-7 with 15 YOS	$51,216	$8,536	$113,342	$88,510	$51,003	$36,978	0.198	74.3

Source: Warner, J. & Pleeter, S. (2001) The Personal Discount Rate: Evidence from Military Downsizing Programs. *The American Economic Review*, 91(1) 33–53. https://www.aeaweb.org/articles?id=10.1257/aer.91.1.33/

2. Implementation of Incentives

Although SSB and VSI were the same across services, each service implemented the programs differently. The Army offered both SSB and VSP to overstaffed MOSs and stated it will use involuntary separation if SSB and VSP does not meet the required reductions. The Navy offered SSB and VSP to certain MOSs like the Army but said it would not use involuntary separation to meet its goals (Mehay & Hogan, 1998). The Air Force used the most aggressive approach. It divided MOSs into five tiers. Tier 1 had no threat of involuntary separation while tiers 2 to 5 had an increasing threat of separation. The different approaches by each service provided researchers a quasi-experiment for studying the effects of SSB and VSI.

3. Lessons Learned

The 1990s provided multiple lessons for future drawdowns. Most importantly, monetary separation incentives increased voluntary separations for mid-careerist. Mehay and Hogan (1998) conclude that SSB and VSI's effect on voluntary separations was positive but small for the Navy; however, the effect was significant enough to meet its drawdown goal. Mehay and Hogan (1998) highlight individuals not at a normal reenlistment point were also allowed to separate during the 1990s drawdown. This is similar to the YCS and education payback waivers the Marine Corps provided during the 2013–2016 drawdown. Combining a small increase in separations at normal reenlistment point and a large increase in separations of individuals not at a reenlistment point likely provided the Navy with the necessary amount of separations. A separate study, by Asch and Warner (2001), on the Army's drawdown shows SSB and VSI increases probability of separation by 13.5 percentage points.

Service members have an affinity for the lump-sum, SSB, payment versus the annuity, VSI program (Warner & Pleeter, 2001). Before SSB and VSI implementation, DoD economists predicted half of enlisted personnel would take the lump-sum payment option and virtually all officers would take the annuity option because of the large discount rate necessary to make SSB equal to VSI. Conversely, 50 percent of officers took the lump-sum option and over 90 percent of enlisted personnel took the lump-sum payment. The difference between the DoD economists' prediction and the actual choices made by service members might have saved taxpayers $1.7 billion in severance cost.

Additionally, the 1990s drawdown showed the threat of involuntary separation increases the rate of voluntary separations (Mehay & Hogan, 1998). The Air Force threat of separation tier system gave airmen an additional incentive to accept SSB or VSI since the involuntary separation pay was lower than SSB and VSI. Airmen in the two tiers with the highest threat of involuntary separation had probabilities of accepting SSB or VSI 6.59 and 7.35 points higher than Navy personnel that did not have a threat of involuntary separation. This highlights a common sense theory that individuals threatened with the possibility of a worse payout will accept the voluntary payout; however, it does not address the detriment to morale that involuntary separations or layoffs cause.

A major concern for drawdown and retention systems is maintaining quality. Multiple studies of the 1990s drawdown show the SSB and VSI acceptance rates increase for lower-quality personnel. Asch and Warner (2001) estimate an acceptance difference of 15.7 percentage points between high-quality and low-quality Army personnel: 13.5 percent and 29.2 percent, respectively. Mehay and Hogan (1998) estimate Sailors with lower AFQT scores had a slightly higher but statistically significant probability of accepting SSB and VSI during the drawdown. The differences in effect between the Army and Navy probably have to do with difference in the moderate threat of involuntary separation for Soldiers versus the almost nonexistent threat of involuntary separation for Sailors. A recent study on Marine Officer retention during the 2013–2016 drawdown, concludes that higher quality officers stayed in the Marine Corps. The study compared Marine Captains' FITREPs and Career Designation (CD) statistics from the plus-up to drawdown (Bacolod, Griner, & Seagren, 2017).

This thesis contributes to the previous mention literature by evaluating the effects of separation incentives, VSP and TERA, on Marine Corps pilots and NFOs during the recent drawdown. Most other drawdown studies focus on the Army, Navy, and Air Force and mostly on enlisted personnel. My thesis provides insights on how demographics, aircraft flown, and quality predicts a Marine pilot's or NFO's probability of taking VSP or TERA.

III. DATA AND METHODOLOGY

This section describes the data used to estimate the effects of VSP and TERA on Marine Corps pilots and NFOs during the 2013–2016 drawdown.

A. DATA SOURCES

The population in this study includes all Marine Corps pilots and NFOs in the Active Duty component that held the rank of Captain, Major, or Lieutenant Colonel between January 2008 and December 2018. Data of Marine Corps pilots and NFOs who separated are observed at the date of separation, while data of those that did not separate are as of December 2018. I requested demographic, pay, and FITREP data from multiple departments within the Marine Corps.

1. Total Force Data Warehouse (TFDW)

TFDW supplied the Marine Corps pilot and NFO demographic and pay data in separate files. TFDW stripped both files of personal identifiable information (PII) and gave each Marine a unique identification code in order to merge individuals' demographic data with their respective pay and FITREP data. The demographic data set includes a single entry for each individual in the study population. TFDW supplied all variables requested to include separation dates and codes to determine how the individuals separated (e.g. TERA, VSP, Completion of Contract, or normal Retirement).

The pay data set includes monthly base pay and ACIP as well as any ACP the individual received. Therefore, this data set has multiple monthly entries for the same Marine from FY2006 to FY2018.

2. Manpower Management Records and Performance-30 (MMRP-30)

MMRP-30 supplied FITREP data for each Marine pilot or NFO identified by TFDW as part of my study population. MMRP-30 uses the same unique identification code as TFDW so a Marine's FITREP data can merge with their demographic and pay data. Each Marine has a Reporting Senior (RS) and Reviewing Officer (RO) summary entry as well as an entry for every FITREP they received. Each FITREP entry includes all FITREP data except names, SSN or EDIPI, billet description and accomplishments, justifications, RS comments, and RO comments.

3. Observations

After cleaning the data, I drop FY 2019 separations, since they do not represent a full year of separations, which reduces my observations to 6597. I drop an additional 86 Marines with incomplete FITREP data, which reduces the observations to 6511 for any models using FITREP data.

B. VARIABLES

1. Dependent Variables

a. Attrition

TFDW separation data includes date of separation, separation code, and separation narrative. Since VSP and TERA were fiscal year programs, I break Marines into separation groups based on fiscal year. VSP and TERA have unique separation codes, along with other separations categories, that I use to divide Marines into additional separation groups—*VSP*, *TERA*, *Normal Retirement*, *Completed Required Service*, and *Other*. *Normal Retirement* includes all Marines who retire after 20 years of service. *Completed Required Service* includes Marines separating at a normal separation points prior to reaching retirement (e.g., after completing their eight-year Naval Aviator contract). The *Other* category includes Marines separating due to misconduct, disability, or death.

I split Marines into these groups to track separations trends by fiscal year from FY 2008 to FY 2017 and develop models to determine the characteristics of the Marine pilots and NFOs separating during the time period.

b. Average Reporting Senior Relative Value – Cumulative

To capture quality as measured by job performance, I use the Marine's cumulative score on the FITREP and then break Marines into three groups—*Bottom Third*, *Middle Third*, and *Upper Third*. The FITREP is an instrument designed to measure a Marine's job performance. Marine Officers receive a FITREP at least annually throughout their career, and on which they are called the Marine Reported On (MRO) (USMC, 2015). There are two main quantitative measurements of each FITREP. The first is the Reporting Senior's (RS) Relative Value (RV). An RS is the MRO's direct supervisor and evaluates the MRO on 14 characteristics with a range of 0 through 7 for each characteristic with 0 meaning the characteristic is not observed by the RS and not graded, 1 is adverse, and 7 means the Marine is of the highest quality in that evaluated characteristic (USMC, 2015).

The 14 grades are then averaged to get an RS average. The RV rescales the RS average into an 80 to 100 score with 90 equaling average for that respective RS. A MRO will receive a RS RV at Processing score that stays the same throughout the MRO's career. In addition, the MRO receives a RS RV – Cumulative score, which adjusts as the RS writes more FITREPs on Marines of the same rank as the MRO. The RS RV – Cumulative is designed to account for fluctuations of an RS as the RS writes more FITREPs throughout their career. MROs can use the RS RV – Cumulative to judge their performance relative to other Marines.

The Average RS RV – Cumulative is an average of the MRO's history of the RS RVs; it is cumulative throughout a Marines' career regardless of rank. This score is on the same 80 to 100 scale with 90 equaling average. I use this variable to measure the stock or cumulative quality of a Marine's job performance, in assessing the effect separation incentives had on the quality of Marines separating. Figure 4 in Appendix B show the kernel density of Marines' Avg RS RV – Cumulative for Marine pilots and NFOs based on separation category.

Additionally, the Marine Corps breaks Marines into thirds based off their RS RV scores. RS RVs from 93.34 to 100 are in the upper third, 86.67 to 93.33 equal the middle third, and 80 to 86.66 is the bottom third (USMC, 2015). I split Marines into thirds based off their Avg RS RV – Cumulative score. If a Marines Avg RS RV – Cumulative score is 93.34 to 100 the Marine is in the *Upper-Third*, scores between 86.67 and 93.33 go in the *Middle-Third*, and scores between 80 and 86.66 go in the *Bottom-Third*.

c. *Reviewing Officer Percent Below*

The RO comparative assessment is a FITREPs second main quantitative measurement. The RO is the RS's boss and gives the MRO a ranking from 1 to 8 based on all the Marines the RO has known in MRO's rank (USMC, 2015). The Marine Corps breaks Marines' RO comparative assessment into three categories – percent above, percent with, and percent below. Percent above is the percentage of reports that have higher RO comparative assessment marks than the MRO. The percent with have the same RO comparative assessment marks as the MRO, and the percent below is the percentage of reports that have lower RO comparative assessment marks. The goal is to have a higher percent below because that means more Marines were marked lower than the MRO. I use RO Percent Below as an additional measure of how VSP and TERA affect the quality of Marine Pilots and NFOs separating during the drawdown.

I also break Marines into three groups based off the where their highest percentage lie in the percent above, percent with, and percent below. I place Marines' with the highest percentage in the percent above category in the *More-Above* group and consider them lower quality Marine officers. I place Marines with the highest percentage in the more with category or evenly split across the three categories in the *More-With* group and consider them average Marines officers. Finally, I place Marines with the highest percentage in the percent below category in the *More-Below* group and considered them high-quality Marine officers.

2. Independent Variables

Most of the independent variables in my study are self-explanatory and this section provides my reasoning for choosing them and for not choosing certain independent variables used in the Literature Review studies. The independent variables in this study deal with MOS, demographics, and FITREP.

Marine pilots and NFOs have a primary MOS (PMOS) that identifies which aircraft they fly or ride in to talk on the radio and flip switches. I split Marine pilots into fixed wing and rotary wing groups and NFOs made a third PMOS group. These groups represent the largest distinction among Marine pilots and NFOs. It also represents the ease of transitioning to the commercial airlines in the private sector. Fixed wing pilots have the easiest transition followed by rotary wing pilots while NFOs do not have an ability to directly transition to the airlines.

Some pilots and NFOs have additional MOSs (AMOS) that indicate an additional qualification. I use Weapons Tactics Instructor (WTI), Aviation Safety Officer (ASO), and Forward Air Controller/Air Officer (FAC) AMOSs for pseudo performance characteristic. Marine pilots and NFOs can have zero AMOSs or multiple. My study does not include the new aviation AMOSs, such as 7533 Aircraft Section Lead, because those AMOS are not retroactively assigned to Marines already separated.

My demographic variables are number of dependents, whether a Marine was prior enlisted, whether their degree is in the STEM field (Science, Engineering and Math), and if they have a post-bachelor's degree. I code the dependents variable as an indicator to see if individuals with two or more dependents behave differently than those with less than two dependents. This variable essentially indicates whether or not the Marine has children. I also examine prior enlisted, because prior enlisted have more years in service than non-prior enlisted at the same rank. Finally, I use STEM and post-bachelor degree to see if the type of degree an individual has plays a role in separation. STEM and post-bachelor degrees are typically relatively more valuable in the civilian labor market.

In the in-depth probit models with attrition as the dependent variable, I use RS RV – Cumulative categories and RO Percent Below categories as an independent variable along with MOS variables. Conversely, in the Probit models with *Upper-Third*, *Middle-Third*, and *Bottom-Third* of RS marks and *More-Below*, *More-With*, and *More-Above* RO marks as the dependent variables, I use attrition, *VSP*, and *TERA* as independent variables to estimate the quality of Marine pilots and NFOs leaving the Marine Corps through separation incentives.

C. METHODOLOGY

To answer my research questions, I use an event study design instead of a Difference-in-Difference (DiD) approach. A DiD initially appears more applicable, because VSP and TERA were policy changes that happened to a group of individuals during a certain period of time. It is natural then to estimate the difference in outcomes across time for the eligible population vs. the non-eligible. However, the nature of VSP's and TERA's implementation would confound any DiD estimates. Implementing it alone would be challenging as the treatment and control groups change each year and sometimes within a year. Also, the two communities that were not eligible for VSP and TERA were the F-35 and MV-22 communities, which were growing during this period. The control group is thus changing in a significantly different way than the groups eligible for VSP and TERA. In sum, there were multiple confounding events between the groups than just VSP and TERA, lending a DiD approach not credible. Instead, I apply regression methods and effectively use an event-study design to form estimates of the effects of VSP and TERA.

1. Primary Research Question Model 1

My primary research question asks: What was the effect of separation incentives, specifically VSP and TERA, on the separation of Naval Aviators and NFOs? Answering this question requires using descriptive statistics as well as Probit models to find the separation trends and characteristics of those that separated during VSP and TERA implementation. I begin by plotting separation codes across fiscal years 2008 to 2017 to see the movement of separations. My goal here is to see whether fiscal years 2013 to 2016 display an increase in separations, giving us a descriptive snapshot of the data.

Using the following Probit model adds additional context to answer the primary research question:

$$\Pr(Y_i = 1) = \Pr\{X_i + \alpha_1 FWPilot + \alpha_2 NFO + \alpha_3 WTI + \alpha_4 ASO + \alpha_5 FAC + \alpha_6 (\geq 2Dependents) \\ + \alpha_7 STEMDegree + \alpha_8 PostBachelors + \alpha_9 PEnlisted\}$$

where Y_i=1 if the Marine *i* took up VSP or TERA, *FWPilot*=1 if *i* was a fixed wing pilot, *NFO*=1 if *i* was a NFO, *WTI*=1 if *i* was a WTI, *ASO*=1 if *i* was a ASO, *FAC*=1 if *i* was a FAC or AO, *(≥2Dependents)*=1 if *i* had two or more dependents, *STEMDegree*=1 if *i* had a STEM undergraduate degree, *PostBachelors*=1 if Marine *i* had a Masters or Doctorate Degree, and *PEnlisted*=1 if *i* was prior enlisted.

I first estimate the model over the study's population of 6957 individuals. Then I restrict the sample to those individuals eligible for VSP or TERA. Finally, I use samples corresponding to each year of VSP and TERA eligibility – 2013, 2014, 2015, and 2016. My primary parameters of interest are the coefficients for *FWpilot* and *NFO* because these coefficients show differences, if any, in the VSP/TERA separation of fixed wing pilots and NFOs relative to rotary wing pilots.

Next, I break down Marine pilots and NFOs into aircraft platform and add additional demographic variables to further evaluate VSP's and TERA's effect on Marine pilot and NFO separations. I use the following Probit model for a more in-depth evaluation:

$$\begin{aligned}
&\Pr(Y_i = 1) = \Pr\{X_i\beta + \alpha_1 AV8BPilot + \alpha_2 FA18Pilot + \alpha_3 FA18WSO + \alpha_4 EA6BPilot + \\
&\alpha_5 EA6BECMO + \alpha_6 KC130Pilot + \alpha_7 CH46Pilot + \alpha_8 UH1Pilot + \alpha_9 CH53Pilot + \\
&\alpha_{10} AH1Pilot + \alpha_{11} WTI + \alpha_{12} ASO + \alpha_{13} FAC + \alpha_{14} Age + \alpha_{15} Female + \alpha_{16} Married + \\
&\alpha_{17} MiltarySpouse + \alpha_{18}(\geq 2Dependents) + \alpha_{19} PEnlisted + \alpha_{20} White + \alpha_{21} Hispanic \\
&+\alpha_{22} ServiceAcademy + \alpha_{23} STEMDegree + \alpha_{24} PostBachelors + \alpha_{25} UpperThird + \\
&\alpha_{26} MoreBelow\}
\end{aligned}$$

where Y_i = 1 if the Marine *i* took up VSP or TERA, *AV8Pilot*=1 if *i* was an AV-8B pilot, *FA18Pilot*=1 if *i* was an F/A-18 pilot, *FA18WSO*=1 if *i* was an F/A-18 WSO, etc. *Female*=1 if *i* was a Female, *Married*=1 if *i* was a Married, *MilitarySpouse*=1 if *i* has a military spouse, *White*=1 if *i* was White, *Hispanic*=1 if *i* was hispanic, *ServiceAcademy*=1 if *i* graduated from a service academy, *UpperThird*=1 if Marine *i* was in the upper third of RS marks, and *MoreBelow*=1 if *i*'s percent below was greater than their percent with and percent above for RO marks.

2. Primary Research Question Model 2

My other primary research question asks: Were there possible tradeoffs in quantity and quality, as measured by FITREPS, of separations due to VSP and TERA among Naval Aviators and NFOs?

While the descriptive statistics mentioned above answer how VSP and TERA affected the quantity of separations, I use the following probit models to answer if VSP and TERA affected the quality of pilots and NFOs separating from the Marine Corps:

$$\Pr(Y_i = 1) = \Pr\{\alpha_0 + \alpha_1 FWPilot + \alpha_2 RWPilot + \alpha_3 NFO + \alpha_4 VSP + \alpha_5 TERA + \alpha_6 Separated20082012 + \alpha_7 Separated20132016\}$$

where $Y_i = 1$ if the Marine *i* is either in the *Bottom-Third*, *Middle-Third*, or *Upper-Third* category of RS marks, or $Y_i = 1$ if Marine *i* is either in the *More-Above*, *More-With*, or *More-Below* category of RO marks. The independent variables are the same for each model; the dependent variable is what changes across models.

Also, *VSP*=1 if *i* took VSP, *TERA*=1 if *i* took TERA, *Separated*20082012=1 if *i* separated from the Marine Corps between 2008 and 2012, *Separated*20132016=1 if *i* separated from the Marine Corps between 2013 and 2016.

These six models use the primary quantitative measurements in Marines' FITREPs to show the effect VSP and TERA have on the quality of pilots and NFOs separating the Marine Corps.

My primary parameters of interest are the coefficients on *VSP* and *TERA*, as they indicate the probability of which quality category a Marine will be in given he or she separated due to VSP or TERA. When using $RSUpperThird_i$ *or* $ROMoreBelow_i$ as dependent variables, a positive *VSP* and/or *TERA* coefficient means VSP and/or TERA takers have a greater probability of being a high-quality Marine. Similarly, when $RSBottomThird_i$ or $ROMoreAbove_i$ are the dependent variables, a negative *VSP* and/or *TERA* coefficient means VSP and/or TERA takers also have a greater probability of being a high-quality Marine. Differences between *VSP* and *TERA* coefficients within the same model indicates VSP and TERA have opposing effects on the quality of Marines who separated from those programs.

IV. RESULTS

A. OVERALL SEPARATION CHARACTERISTICS

Figure 4 shows the number of separations of Marine pilots and NFOs by fiscal year from 2008 to 2018. The separation categories are *Retire*, *Complete Contract*, *VSP*, *TERA*, and *Other*. The *Retire* category includes individuals that took a normal post-20 years of service retirement and is the largest separation category each year. There is a large increase in separations during the drawdown and most of the increase appears to be due to VSP and TERA. Of the total separations in 2013, 2.5% separated through VSP and 8.6% separated via TERA. In 2014 as eligibility increased, it was 15% and 12% for VSP and TERA, respectively. In 2015 as eligibility was modified, it was 7.5% and 13.3% for VSP and TERA, respectively. Additionally, separations decrease in FY 2016 when VSP is stopped and TERA eligibility is significantly cut. Figure 4 is evidence that VSP and TERA worked as needed to reduce the amount of pilots and NFOs in the Marine Corps.

Figure 4. Marine Pilot and NFO Separations by Fiscal Year

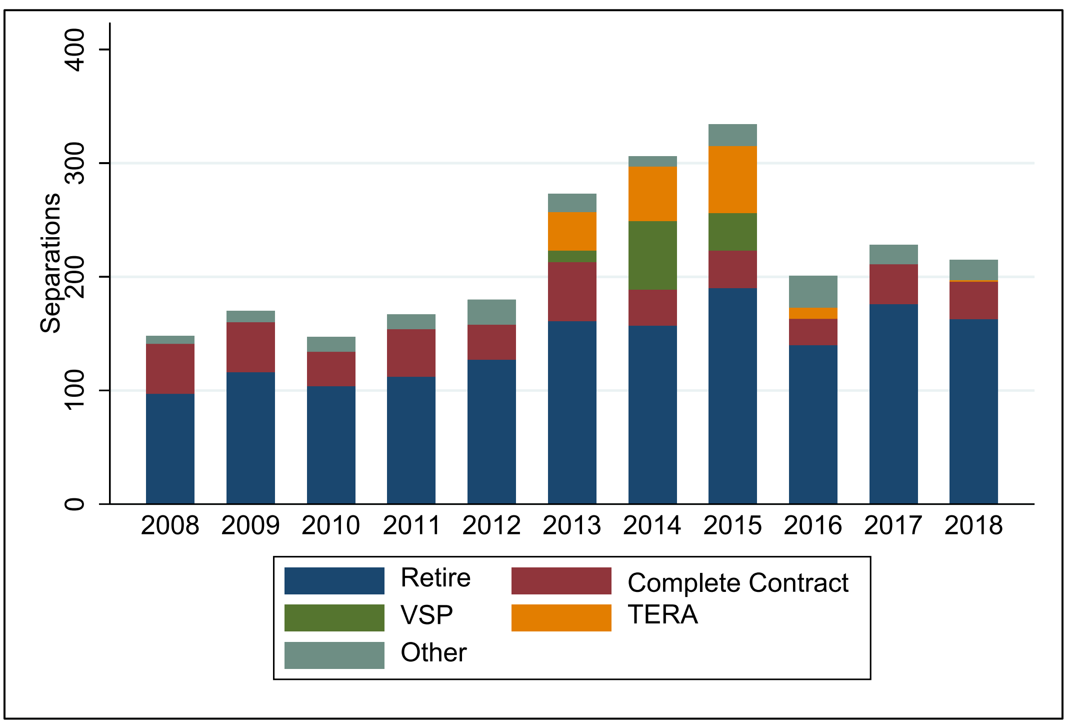
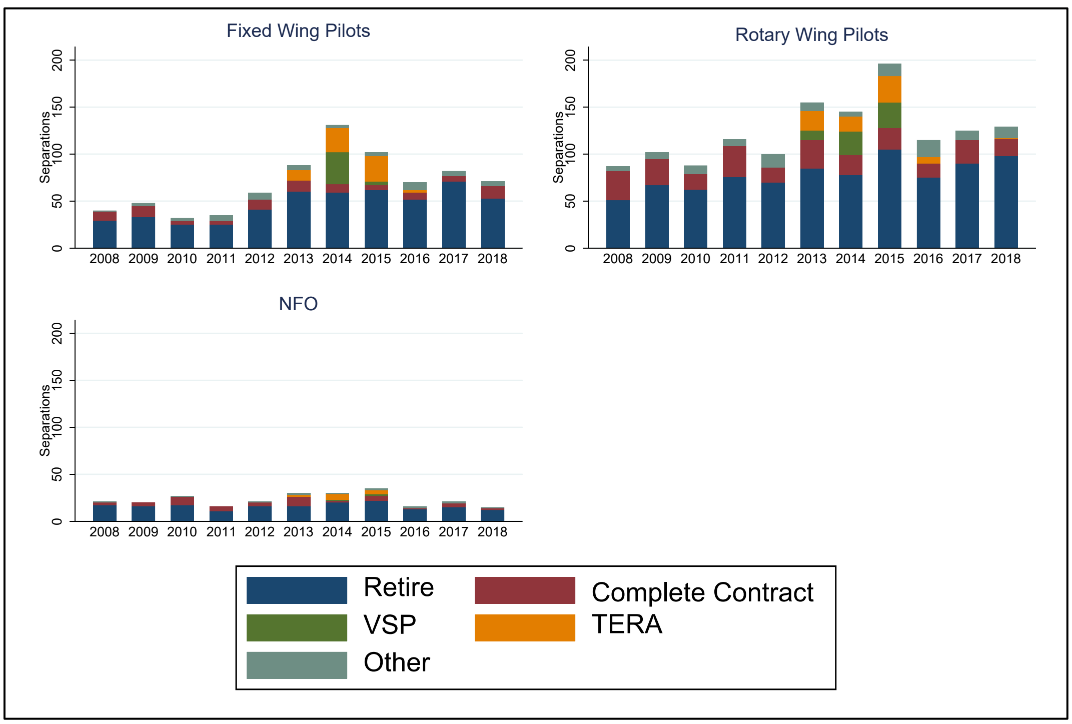


Figure 5 breaks separations into FW pilots, RW pilots, and NFO MOS groups by fiscal year. FY 2014 has the largest increase in FW pilot separations from VSP and TERA. This is because FY 2014 has the largest eligibility for FW pilot MOSs. FW pilots were not eligible for VSP in FY 2013. Captains and Majors not selected for promotion were the only FW pilots and NFOs eligible for TERA in FY 2013 which accounts for the small amount of TERA separations in FY 2013 from their MOS groups. FW pilot separations from VSP had a large increase in FY 2014 and then diminished in FY 2015. While eligibility for FW pilots decreased from FY 2014 to FY 2015 it appears that any FW pilot that wanted VSP went ahead and took it in FY 2014. This could be due to individuals not knowing if VSP would be available in FY 2015 or because the Marine Corps denied applications of FW pilots requesting to separate via VSP in FY 2015. This is a large issue with evaluating VSP and TERA since the Marine Corps could deny VSP and TERA once the quota for separations was met for a specific MOS and I cannot see that in the data available.

Figure 5. Marine Pilot and NFO Separations by MOS Group

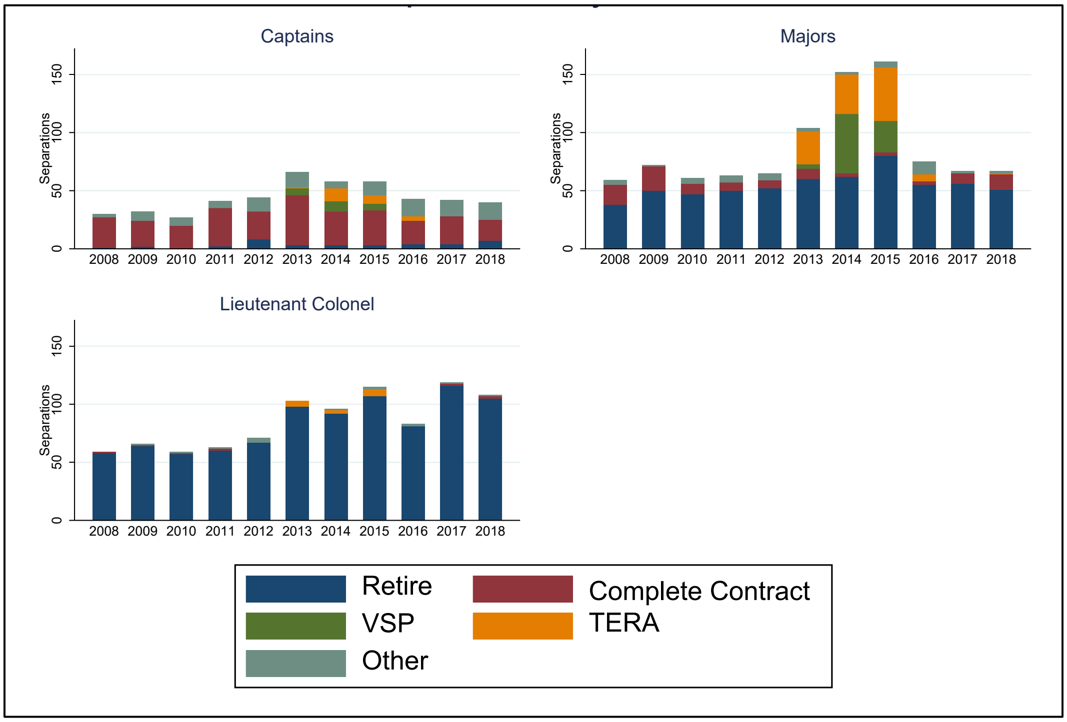


RW pilots show an increase in separations from VSP and TERA throughout the drawdown years. There is a second increase in separations in FY 2015, but part of that increase appears to be from normal retirement. This could be from an increase in retirement eligible RW pilots, airline hiring, or SERB selections. However, what is important is VSP and TERA separations increased RW separations and those separations from VSP and TERA were relatively stable during the drawdown years.

NFO separations do not appear to increase much during the drawdown. But the number of NFOs in the Marine Corps is relatively small compared to FW and RW pilots. Therefore, a large increase is not expected, but VSP and TERA do account for an increase in separations during the drawdown years. FY 2013 shows an increase in NFOs separating due to contract completion. This could be due to the Marine Corps forecasting the sundown of NFO platforms, F/A-18D and EA-6B, and NFOs see a lack of future opportunities in the Marine Corps for NFOs. Combining the drawdown and platform sundown likely incentivized NFOs to separate after contract completion more than usual.

Figure 6 displays separations by rank from FY 2008 to FY 2018. Overall, Majors appear to be most affected by VSP and TERA, which is good because they were the target population. Majors are the mid-careerist in the Marine Corps that would usually stay at least until they meet the 20 YOS retirement requirement. VSP and TERA were incentives targeted to mid-careerist that were on the fence about getting out or staying until 20 YOS to go ahead and leave the Marine Corps. The increase in separations of Majors from FY 2013 to FY 2014 is due to the increase in MOS eligibility from FY 2013 to FY 2014.

Figure 6. Marine Pilot and NFO Separations by Rank



Interestingly, the Captain graph shows a small increase in separations from VSP and TERA during the drawdown. There is a noticeable increase in Captain separations from FY 2012 to FY 2013 due to contract completion. This could be similar to the increase in NFO separations discussed above where Captains see a drawdown of the Marine Corps as a decrease in future opportunities in the Marine Corps and decide to separate. This is an unintended consequence of the drawdown, but it also helps the Marine Corps meet its drawdown goals.

B. DEMOGRAPHIC SEPARATION CHARACTERISTICS

1. Dependent Variable: TERA vs. VSP

The next question I ask is, "Who took up VSP or TERA?" In particular, I examine the demographic data of those that took VSP or TERA during the drawdown, and then the characteristics of those that took VSP only, and finally those that took only TERA. To evaluate the programs, I first compare taker characteristics among all pilots and NFO holding the rank of Capt through LtCol from 2008 to 2018. Second, I compare taker characteristics among only those eligible for the programs. Finally, I compare taker characteristics by fiscal year. All probit results are marginal effects evaluated at the means of each independent variable.

Overall, Column 1 in Table 3 shows being a WTI and having two or more dependents are the only characteristics that are statistically significant predictors of taking VSP and TERA during the drawdown for the study population. Being a WTI decreases the probability of taking VSP or TERA by 0.012 at the means. Since the WTI qualification is very specific to the Marine Corps, it makes sense that individuals with institutional specific training chose to stay in the Marine Corps. Being a WTI maintains its negative effect of taking VSP and TERA when the samples are broken into eligibility (column 2) and fiscal year (columns 3–5); however, WTI is not a statistically significant predictor in FY 2013.

Table 3. VSP and TERA Taker Characteristic Models

	(1) Overall	(2) Eligible	(3) FY2013	(4) FY2014	(5) FY2015	(6) FY2016
VSP/TERA						
FW Pilot (d)	0.010	-0.005	-0.076**	0.004	-0.000	-0.015
	(0.005)	(0.013)	(0.025)	(0.013)	(0.011)	(0.032)
NFO (d)	-0.011	-0.038*	-0.085**	-0.035*	-0.011	
	(0.008)	(0.018)	(0.030)	(0.017)	(0.018)	
WTI (d)	-0.012*	-0.059***	-0.016	-0.035**	-0.041***	
	(0.005)	(0.012)	(0.031)	(0.012)	(0.010)	
ASO (d)	0.003	-0.026	-0.072**	-0.012	-0.016	
	(0.006)	(0.014)	(0.027)	(0.014)	(0.011)	
FAC/AO (d)	-0.000	-0.044***	0.016	-0.040**	-0.033***	
	(0.006)	(0.012)	(0.033)	(0.012)	(0.010)	
>=2 Dependents (d)	0.019***	0.014	0.041	0.019	0.015	0.021
	(0.005)	(0.013)	(0.027)	(0.013)	(0.010)	(0.032)
STEM Degree (d)	0.003	-0.003	0.015	0.007	0.005	0.039
	(0.005)	(0.013)	(0.028)	(0.013)	(0.011)	(0.039)
Post-Bachelors (d)	-0.004	-0.030*	-0.025	-0.035**	-0.019	0.009
	(0.006)	(0.013)	(0.029)	(0.013)	(0.011)	(0.047)
Prior Enlisted (d)	-0.005	-0.025	-0.065*	-0.011	-0.010	-0.008
	(0.006)	(0.014)	(0.026)	(0.014)	(0.011)	(0.036)
Observations	6595	2403	591	2150	1810	194
R-squared						

Marginal effects; Standard errors in parentheses
(d) for discrete change of dummy variable from 0 to 1
* p<0.05, ** p<0.01, *** p<0.001

Data is missing from NFO, WTI, ASO, and FAC/AO for FY 2016 because Marines with those MOSs did not use VSP or TERA in FY 2016.

Meanwhile having two or more dependents increases the probability of taking VSP or TERA by 0.019 for the overall population. This indicates that Marines in the aviation community with children are relatively more incentivized to separate by these programs than those without children. However, having two or more dependents loses its statistical significance when the samples are broken into eligibility and fiscal year. While the estimates for these sub-samples are not statistically significant, it remains economically meaningful and in the expected positive direction. For example, in column 3 in FY2013, having two or more dependents increases the probability of take-up by 0.04.

FW pilots and NFOs have a lower probability of taking VSP or TERA in FY 2013 by 0.08 and 0.09, respectively. This is expected since VSP and TERA were only offered to CH-46 pilots, RW pilots, in FY 2013. In addition, NFOs display a statistically significant lower probability of separation among eligible officers. NFOs lower probability to separate via VSP or TERA is logical because like the WTI qualification, NFO is a very military specific job and often referred to mean "No Future Outside."

FAC/AO is another qualification that decreases the probability of separating because of its military specific training, due to a high propensity of service, or both. It has a statistically significant effect at decreasing the probability by 0.044 among the eligible sample, 0.039 in FY 2014, and 0.033 in FY 2015.

Individuals with a post-bachelor's degree have a lower probability to use VSP and TERA among those eligible, but this effect seems to be due to FY 2014 separations since that is the only year where having a post-bachelor degree has any statistical significance.

Individuals with STEM degrees do not have a statistically different probability of taking VSP or TERA compared to those without a STEM degree. This is surprising since individuals with STEM degrees presumably have better prospects outside the Marine Corps.

Appendix Tables 9 through 11 report more extensive probit models, which include other characteristics related to who took up the programs. Overall these results show that each pilot MOS and NFO MOS is a positive predictor of being a VSP or TERA taker. Column 1 of Table 7 shows the CH-46 pilot MOS is the largest predictor likely because it was the most eligible MOS for VSP and TERA. FW pilot MOSs behave relatively similar to each other as well as NFO MOSs. CH-46 pilots behave differently than the other RW pilot MOSs likely because of eligibility and it is a dying community. WTI, ASO, and FAC/ AO qualifications are still negative predictors of taking up VSP or TERA. Importantly, female, married, military spouse, white, Hispanic are not statistically significant predictors of VSP or TERA taker status.

2. Dependent Variable: VSP vs. TERA

Next I examine the characteristics of those who took up VSP and TERA separately to compare and contrast the characteristics of those who took up either program. Table 4 shows the VSP takers' characteristics, and Table 5 shows the TERA takers' characteristics.

While being NFO has a statistically significant negative coefficient in the previous model, it only shows statistical significance with VSP. Conversely, WTI, FAC/AO, and two or more dependents lose their statistical significance in the VSP only model while maintaining statistical significance in the TERA model. Being a WTI predicted the largest decrease in probability of taking TERA among those eligible at -0.091. Being a FAC/AO also predicted a significant decrease in the probability of taking TERA among the eligible population at -0.087. Having a post-bachelor's degree and being prior enlisted produce a statistically significant negative probability of individuals taking VSP when compared to the entire population, eligible sample, and each fiscal year – except for prior enlisted in FY 2013. Having a post-bachelor's degree and being prior enlisted were the only statistically significant negative predictors among the eligible sample.

Table 4. VSP Taker Characteristic Models

	(1) Overall	(2) Eligible	(3) FY2013	(4) FY2014	(5) FY2015
VSP					
FW Pilot (d)	0.001	-0.010		-0.008	-0.016**
	(0.003)	(0.010)		(0.010)	(0.006)
NFO (d)	-0.010**	-0.038***		-0.037***	-0.007
	(0.003)	(0.010)		(0.010)	(0.008)
WTI (d)	0.002	-0.006	0.011	0.002	-0.006
	(0.003)	(0.011)	(0.030)	(0.012)	(0.006)
ASO (d)	0.003	-0.011	-0.017	-0.008	-0.000
	(0.004)	(0.011)	(0.023)	(0.012)	(0.007)
FAC/AO (d)	0.007	-0.003	0.059	-0.003	-0.007
	(0.004)	(0.011)	(0.037)	(0.011)	(0.006)
>=2 Dependents (d)	0.002	-0.004	-0.009	-0.001	0.002
	(0.003)	(0.010)	(0.022)	(0.010)	(0.006)
STEM Degree (d)	-0.003	-0.014	-0.006	-0.011	-0.002
	(0.003)	(0.010)	(0.021)	(0.010)	(0.006)
Post-Bachelors (d)	-0.012***	-0.042***	-0.046*	-0.041***	-0.018***
	(0.002)	(0.009)	(0.018)	(0.009)	(0.005)
Prior Enlisted (d)	-0.011***	-0.040***	-0.032	-0.040***	-0.017**
	(0.003)	(0.009)	(0.020)	(0.009)	(0.005)
Observations	6595	1793	336	1699	1491
R-squared					

Marginal effects; Standard errors in parentheses
(d) for discrete change of dummy variable from 0 to 1
* p<0.05, ** p<0.01, *** p<0.001

Data is missing from NFO, WTI, ASO, and FAC/AO for FY 2016 because Marines with those MOSs did not use VSP in FY 2016.

Table 5. TERA Taker Characteristic Models

	(1) Overall	(2) Eligible	(3) FY2013	(4) FY2014	(5) FY2015	(6) FY2016
TERA						
FW Pilot (d)	0.009*	0.024	-0.022	0.034*	0.025	-0.015
	(0.004)	(0.020)	(0.025)	(0.017)	(0.017)	(0.032)
NFO (d)	0.000	0.004	-0.044	0.017	-0.002	
	(0.006)	(0.034)	(0.032)	(0.030)	(0.027)	
WTI (d)	-0.012***	-0.094***	-0.024	-0.046**	-0.044***	
	(0.003)	(0.017)	(0.027)	(0.014)	(0.013)	
ASO (d)	0.000	-0.030	-0.037	0.009	-0.022	
	(0.004)	(0.020)	(0.026)	(0.019)	(0.014)	
FAC/AO (d)	-0.006	-0.087***	0.011	-0.048***	-0.038**	
	(0.004)	(0.017)	(0.031)	(0.014)	(0.013)	
>=2 Dependents (d)	0.017***	-0.002	0.023	0.032*	0.019	0.021
	(0.003)	(0.023)	(0.026)	(0.015)	(0.014)	(0.032)
STEM Degree (d)	0.005	0.009	0.017	0.026	0.006	0.039
	(0.004)	(0.019)	(0.026)	(0.016)	(0.015)	(0.039)
Post-Bachelors (d)	0.009	-0.037*	0.016	-0.008	-0.013	0.009
	(0.005)	(0.018)	(0.029)	(0.016)	(0.015)	(0.047)
Prior Enlisted (d)	0.007	-0.040*	-0.044	0.015	-0.003	-0.008
	(0.005)	(0.018)	(0.024)	(0.018)	(0.015)	(0.036)
Observations	6595	1196	522	1129	1048	194
R-squared						

Marginal effects; Standard errors in parentheses
(d) for discrete change of dummy variable from 0 to 1
* p<0.05, ** p<0.01, *** p<0.001

Data is missing from NFO, WTI, ASO, and FAC/AO for FY 2016 because Marines with those MOSs did not use TERA in FY 2016.

Being a FW pilot decreased the probability of taking VSP in FY 2015 by 0.016 but increased the probability of taking TERA in FY 2014 by 0.33. The increase could be due to FW pilots not being eligible for VSP or TERA in FY 2013. Once they were eligible in FY 2014 a significant amount took TERA. The Marine Corps reduced FW pilot eligibility from FY 2014 to FY 2015 and reduced the eligibility again in the middle of FY 2015. These curtailments in FW pilot eligibility may explain the negative probability of FW pilots taking VSP in FY 2015. Alternatively, all of the VSP eligible FW pilots that were on the fence about staying or getting out of the Marine Corps took VSP in FY 2014 while there were not many eligible fence sitters in FY 2015.

In sum, demographic characteristics such as gender, race, and ethnicity do not appear to be statistically significant predictors for take-up of VSP or TERA. With the exception of the CH-46 MOS, Marines had relatively similar taker probabilities within their respective FW pilot, RW pilot, and NFO MOS group. In addition, individuals with

Marine specific training such as WTI, ASO, and FAC/AO show a lower probability of taking VSP and TERA. Meanwhile having a post-bachelor's degree and being prior enlisted are significant predictors of not taking VSP but not necessarily TERA. This is an interesting finding given that VSP was a lump-sum incentive while TERA was an annuity. Being prior enlisted likely indicates a high preference for military service. Additionally, prior enlistees are closer to retirement than those of the same rank, which makes VSP less appealing.

C. PERFORMANCE SEPARATION CHARACTERISTICS

My next set of analyses examines the job performance or quality characteristics of those who separated due to VSP or TERA, compared to those who stayed in the Marine Corps separated by other means. Table 6 displays the frequency counts of Marine Corps pilots and NFOs across the job performance distribution (in thirds) as measured by FITREPs, by separation status. Separation status is broken out to evaluate the difference in performance between those that took VSP or TERA and those that separated by a different means or those that have not separated. The numbers in bold in Table 6 correspond to statistically significant coefficients in performance models displayed in Tables 7 and 8.

Table 6. FITREP Characteristics by Separation Status

	RS: Average Relative Value Cumulative Marks			**RO: Average Cumulative Marks**			
	Bottom	Middle	Upper	More Above	More With	More Below	**Total**
VSP	**3**	87	13	**23**	47	**33**	103
	2.9%	84.5%	12.6%	**22.3%**	45.6%	**32.0%**	
TERA	26	107	19	**81**	**45**	26	152
	17.1%	70.4%	12.5%	**53.3%**	**29.6%**	17.1%	
Separated (not thru VSP or TERA)	445	2525	314	1441	1211	632	3284
	13.6%	76.9%	9.6%	43.9%	36.9%	19.2%	
Not Separated	254	2298	502	903	957	1194	3054
	8.3%	75.2%	16.4%	29.6%	31.3%	39.1%	
Total	728	5017	848	2448	2260	1885	6593
	11.0%	76.1%	12.9%	37.1%	34.3%	28.6%	

1. VSP

The first number that jumps out is only three individuals in the bottom third of RS marks took VSP. This amounts to 3 percent of those that took VSP and a 10 percentage point decrease compared to those that separated without VSP or TERA. This means lower quality Marines stayed in the Marine Corps instead of separating by taking VSP. Table 7 shows that being in the bottom third of RS Marks decreased the probability of taking VSP by 0.086; this relationship is statistically significant at the 0.1 percent level.

Table 7. VSP and TERA Performance Characteristics Measured by RS Markings

Probit FITREP Models	(1) Bottom Third	(2) Middle Third	(3) Upper Third
main			
FW Pilot (d)	0.910	-0.970	0.917
	(17.749)	(5.931)	(16.019)
RW Pilot (d)	0.667	-0.859	0.651
	(24.803)	(14.978)	(24.224)
NFO (d)	0.937	-0.864	0.922
	(5.013)	(3.412)	(5.696)
VSP (d)	-0.086***	0.071	0.044
	(0.024)	(0.040)	(0.042)
TERA (d)	0.037	-0.073	0.036
	(0.029)	(0.040)	(0.034)
Separated 2008-12 ~)	0.083***	-0.001	-0.070***
	(0.019)	(0.014)	(0.015)
Separated 2013-16 ~)	0.049***	0.020	-0.061***
	(0.014)	(0.013)	(0.014)
Observations	6593	6593	6593
R-squared			

Marginal effects; Standard errors in parentheses
(d) for discrete change of dummy variable from 0 to 1
* p<0.05, ** p<0.01, *** p<0.001

VSP shows a similar trend of de-incentivizing lower quality Marines to get out while also incentivizing higher quality Marines to get out. Table 8 shows a lower percentage of Marines in the lower quality category of RO Markings (More Above) taking VSP compared to those that separated without VSP or TERA. Additionally, the percentage of high-quality Marines measured by RO marks taking VSP is higher than those that separated without VSP or TERA. Table 8 further shows that Marines with lower RO marks had a lower probability of taking VSP by 0.192 while those with higher RO marks had a greater probability of taking VSP by 0.141 and both were statistically significant.

Table 8. VSP and TERA Performance Characteristics Measured by RO Markings

Probit RO FITREP Models

	(1) More Above	(2) More With	(3) More Below
main			
FW Pilot (d)	0.293	-0.257	0.046
	(0.232)	(0.162)	(0.207)
RW Pilot (d)	0.319	-0.305	0.027
	(0.203)	(0.189)	(0.200)
NFO (d)	0.316	-0.224	0.021
	(0.229)	(0.127)	(0.208)
VSP (d)	-0.192***	0.084	0.141**
	(0.037)	(0.050)	(0.052)
TERA (d)	0.105*	-0.075*	-0.034
	(0.043)	(0.037)	(0.040)
Separated 2008-12 ~)	0.183***	0.032*	-0.194***
	(0.017)	(0.016)	(0.011)
Separated 2013-16 ~)	0.124***	0.046**	-0.154***
	(0.016)	(0.015)	(0.012)
Observations	6593	6593	6593
R-squared			

Marginal effects; Standard errors in parentheses
(d) for discrete change of dummy variable from 0 to 1
* p<0.05, ** p<0.01, *** p<0.001

2. TERA

Meanwhile TERA appears to have incentivized lower quality Marines to get out prior to the normal 20-year military retirement. Table 6 shows individuals in the bottom third of the RS marks are 3.5 percentage points more likely to get out with TERA versus a normal separation; however, when estimated through a probit model and controlling for

MOS group, RS marks do not predict a statistically significant difference in the quality of officers separating via TERA.

RO markings show a 9.6 percentage increase in individuals with more officers rated above them taking TERA versus those that separate normally. It appears that the increase in low quality officers taking TERA came at the expense of the average quality officers since the officers in the more with group have a larger percentage point decrease compared to officers in the more below group. The probit model in Table 8 shows the probability a Marine taking TERA has a 0.105 higher probability of having lower RO marks and a 0.075 lower probability of having average RO marks. This means more Marines with lower RO marks are taking TERA than Marines with average RO marks.

Figure 7, illustrating the distribution of job performance by VSP or TERA, best illustrate these findings. Figure 5 displays the kernel densities for the Avg RS RV – Cumulative of Marine pilots and NFOs that used VSP or TERA (red broken line) compared to those that stayed or separated by another means (blue solid line). In sum, the quality distribution of who got out via VSP or TERA was more varied than the Marines that stayed or separated for other reasons. In other words, both high and low-quality Marines were incentivized to leave by VSP and TERA. In relative terms, VSP appears to have drawn fewer lower quality Marines to separate and more high-quality Marines to separate. This perhaps indicates that the lump-sum nature of VSP provided more incentives for higher quality Marines, while the annuity in TERA had a more distributive effect across the quality distribution.

Figure 7. Kernel Densities for Avg. RS RV – Cumulative

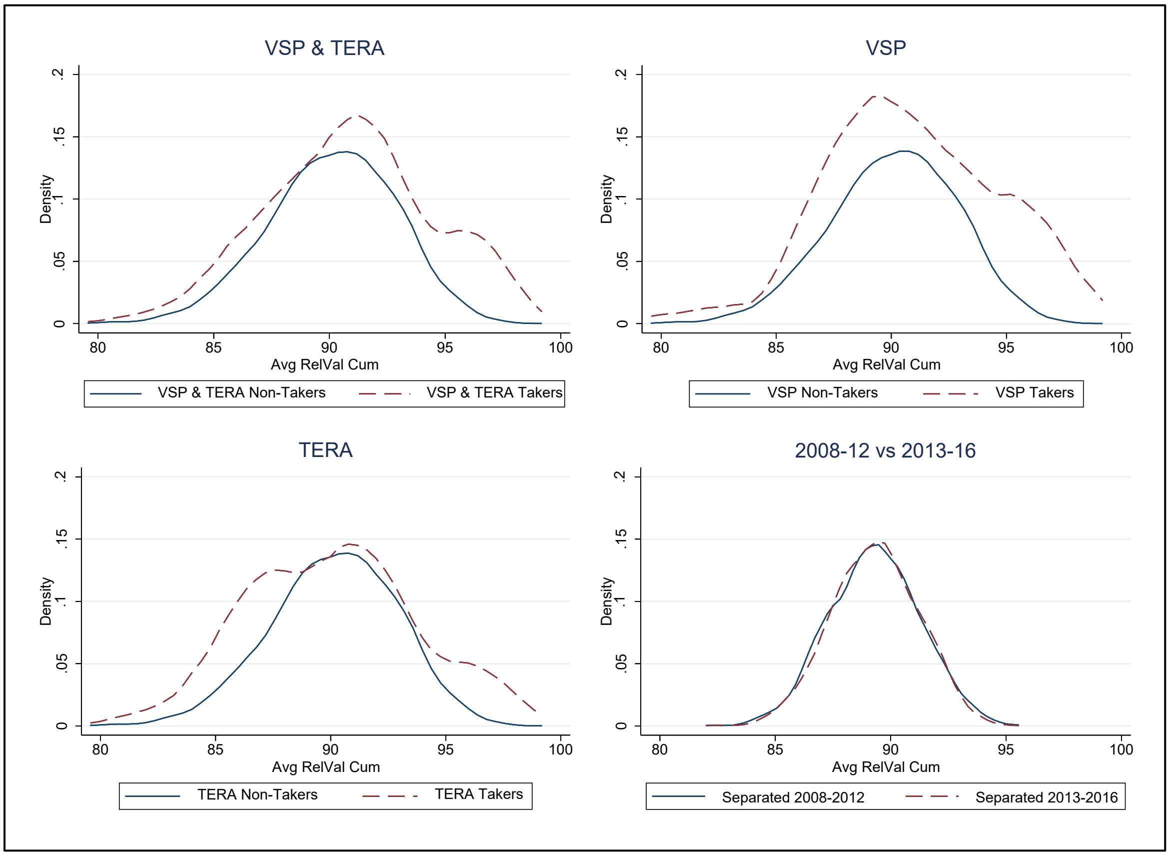
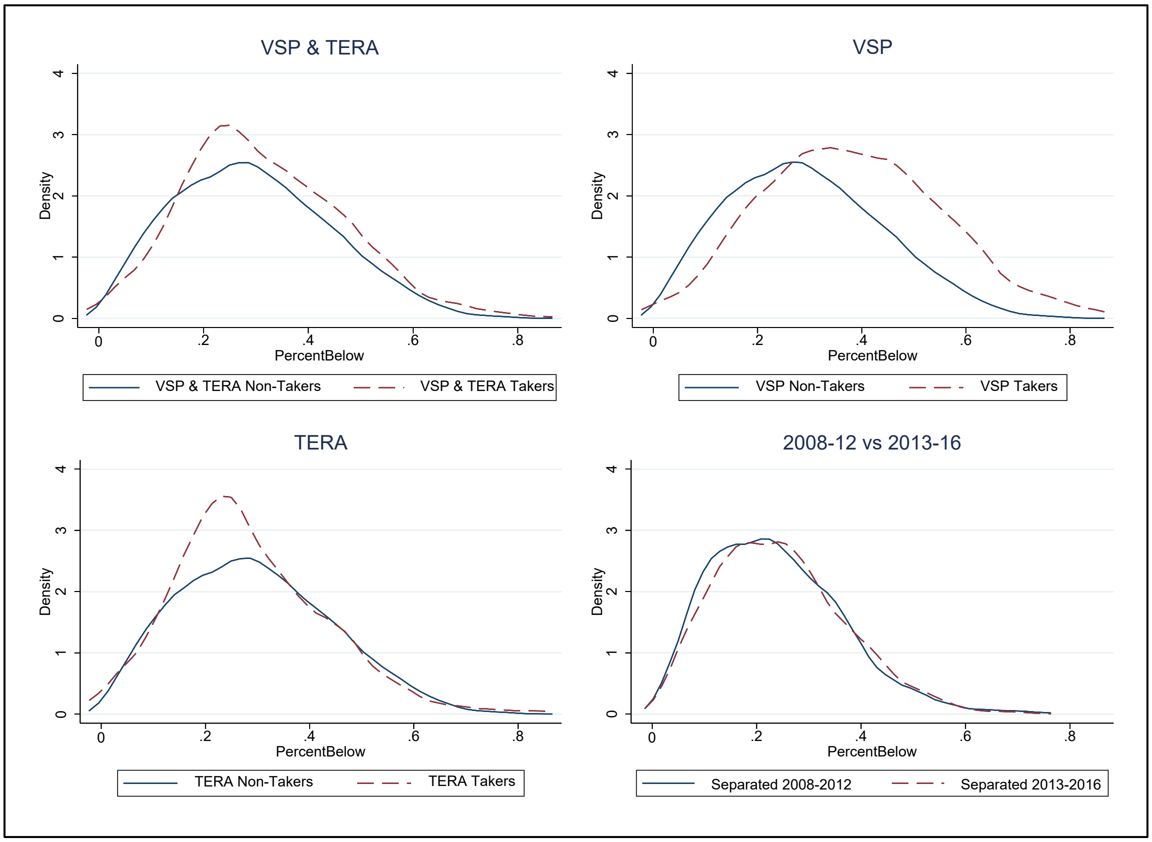


Figure 8 is similar to Figure 5; however, the measurement is the Marines' RO Percent Below, which a higher percent below corresponds to a higher quality Marine. Figure 8 shows VSP takers have higher RO Percent Below and are higher quality Marines. In contrast, TERA appears to incentivize lower quality Marines to separate further confirming that the two programs have opposing effects on quality Marines.

Figure 8. Kernel Densities for RO Percent Below



D. SUMMARY

In terms of predictors, my models show that gender, race, ethnicity, or marital status are not statistically significant predictors of Marine pilots and NFO who took VSP or TERA. With the exception of the CH-46 MOS, Marines had relatively similar taker probabilities within their respective FW pilot, RW pilot, and NFO MOS group. In addition, individuals with Marine specific training such as WTI, ASO, and FAC/AO show a lower probability of taking VSP and TERA.

Regarding quality, VSP and TERA takers have wider Reporting Senior (RS) distributions than those that stayed or separated by another means. VSP also appears to incentivize high-quality Marine pilots and NFOs to separate while TERA does the opposite.

V. CONCLUSIONS, RECOMMENDATIONS, AND FUTURE RESEARCH

A. SUMMARY AND CONCLUSIONS

The priority of VSP and TERA was to incentivize mid-careerists in the Marine Corps to separate and, without a doubt, it was successful in getting Marine pilots and NFOs to separate as shown in Figure 1 in Chapter I. Overall, 255 Marine pilots and NFOs used either VSP or TERA to separate from the Marine Corps between 2013 and 2016 on top of those that separated under other normal categories. The 255 separations from VSP and TERA over four years represents more than any full year's worth of separations from 2008 to 2012. In other words, VSP and TERA provided the Marine Corps with more than five years of separations in a four-year period and was an overwhelming success at getting mid-careerist in the Marine Corps to separate. Another example of VSP and TERA's success is the decrease in MOS eligibility from FY 2014 to FY 2015 and another cut in the middle of FY 2015. The one MOS that VSP and TERA did not decrease enough was the CH-46 pilots since they continued to be eligible for TERA until FY 2018.

In terms of predictors, my models show that gender, race, ethnicity, or marital status are not statistically significant predictors of Marine pilots and NFO who took VSP or TERA. With the exception of the CH-46 MOS, Marines had relatively similar taker probabilities within their respective FW pilot, RW pilot, and NFO MOS group. In addition, individuals with Marine specific training such as WTI, ASO, and FAC/AO show a lower probability of taking VSP and TERA. Since the Marine Corps spends a large amount of money to train WTIs, ASOs, and FAC/AOs, it is positive to see those Marines have a statistically higher probability of staying in the Marine Corps despite the incentives to leave. Although most of these schools require a payback tour, the Marine Corps offered waivers for time-on-station and education payback during the drawdown.

The quality of Marine pilots and NFOs separating significantly differ depending whether they took VSP or TERA. Lower quality Marine pilots and NFOs had a relatively lower probability of taking VSP as measured by both RS and RO marks while higher quality Marine pilot and NFOs had a higher probability of taking VSP as measured by only

RS marks. This is contrary to the augmentation policy the Marine Corps had during the drawdown, which increased the average quality of Marine officers remaining in the Marine Corps (Bacolod et al., 2017).

The probit models show low-quality Marine pilots and NFOs had a higher probability of taking TERA as measured by RO marks. RS marks showed that low and high-quality Marines had an increased probability of taking TERA but neither were statistically significant. Since Marines Captains and Majors not selected to the next rank were eligible for TERA regardless of MOS, part of the eligible TERA population was low quality and contributing to individuals with low RO marks having a higher probability of taking TERA. In addition, lower quality Marine pilots and NFOs that were passed over for LtCol knew they had to retire at 20-YOS; therefore, they decided to retire early with TERA instead of waiting the extra years to meet 20-YOS.

TERA also incentivizes a small portion of high-quality Marines to separate as shown in Figure 7. These might be high-quality Marines that always planned to retire at 20 YOS. Once the Marine Corps offered TERA to their MOS, they jumped on the opportunity to leave the Marine Corps early with a reduce retirement annuity but full retirement benefits. This allowed them to transition to the civilian workforce earlier and giving them possibly greater lifetime earnings potential.

B. RECOMMENDATIONS

It is hard to make recommendations to a program that met its top priority; however, two issues with evaluating the true effectiveness of the VSP and TERA programs is to know eligibility and know who applied for VSP and TERA. The Marine Corps does not have a way to readily identify Captains and Majors not selected for the next rank. Since TERA was eligible for Captains and Majors not selected for the next rank regardless of MOS, the Marine Corps does not have a completely accurate way to calculate TERA eligibility each year. Additionally, the Marine Corps does not have data stored in an easily access format about individuals denied VSP and TERA after applying. Without knowing all the applicants, the numbers of Marine pilots and NFOs approved for and separated with VSP or TERA calculates demand instead of accounting for all the individuals that applied for VSP or TERA. I recommend the Marine Corps to make this information more readily accessible to evaluate the efficiency of programs such as VSP and TERA.

Since quality Marine pilots and NFOs have a higher probability to separate under the VSP program, the Marine Corps should consider a quality adjustment offer for VSP. Since VSP was a lump-sum incentive while TERA was more of an annuity, it is also worth considering whether VSP takers were being rational in an economic sense.

C. FUTURE RESEARCH

The Marine Corps offered VSP and TERA to a large portion of the ground officer MOSs as well as enlisted MOSs during the 2013–2016 drawdown. Just as Marine pilot and NFO MOSs have different job opportunities in the civilian workforce, Marine ground officers have a greater distribution of jobs skills from easily translatable to the civilian workforce to not at all. Additionally, there are more ground officers in the Marine Corps than aviation officers, which will add to the sample population. Future studies evaluating how different ground officer or enlisted MOSs were affected by VSP and TERA will help in future drawdowns in determining which MOSs will be more responsive to separation incentives.

VSP and TERA have opposing effects on the quality of officers separating the Marine Corps. The Marine Corps should determine if ground MOSs behave similarly. This could provide the Marine Corps with an ability to add a quality adjustment to VSP or TERA to incentivize the lower quality Marines to separate.

Further research on the effects of the Blended Retirement System on separations also need to be considered when planning future drawdowns. In a future drawdown, the cliff style vesting of the current 20-year retirement system should not be as big of a motivating factor to keep mid-careerist in the Marine Corps. Therefore, the Marine Corps could get away with a lower VSP or TERA incentive.

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APPENDIX. DETAILED PROBIT MODELS OF VSP AND TERA TAKER CHARACTERISTICS

Table 9. In-depth VSP/TERA Characteristics Model

	(1) Overall	(2) Eligible	(3) FY2013	(4) FY2014	(5) FY2015
VSP/TERA					
AV-8B Pilot (d)	0.077**	-0.265	-0.035	0.076	0.005
	(0.027)	(4.863)	(0.069)	(0.101)	(0.036)
F/A-18 Pilot (d)	0.090***	-0.351	-0.077	0.124	0.087
	(0.026)	(7.505)	(0.045)	(0.111)	(0.085)
F/A-18 WSO (d)	0.017	-0.156		0.004	-0.012
	(0.023)	(1.604)		(0.076)	(0.030)
EA-6B Pilot (d)	0.109*	-0.116		0.155	0.067
	(0.048)	(0.668)		(0.149)	(0.105)
EA-6B ECMO (d)	0.054	-0.143	-0.033	0.075	0.025
	(0.029)	(1.341)	(0.078)	(0.111)	(0.067)
KC-130 Pilot (d)	0.059*	-0.244	-0.089*	0.072	-0.011
	(0.025)	(4.166)	(0.037)	(0.103)	(0.029)
CH-46 Pilot (d)	0.135***	-0.225	0.020	0.195	0.066
	(0.034)	(4.004)	(0.070)	(0.142)	(0.063)
UH-1 Pilot (d)	0.050*	-0.203	-0.102***	0.101	0.001
	(0.024)	(3.013)	(0.030)	(0.118)	(0.035)
CH-53 Pilot (d)	0.038*	-0.416	-0.046	0.034	-0.016
	(0.018)	(8.752)	(0.058)	(0.083)	(0.027)
AH-1 Pilot (d)	0.056**	-0.371	-0.091*	0.092	-0.004
	(0.021)	(7.832)	(0.037)	(0.105)	(0.032)
WTI (d)	-0.009	-0.038	-0.004	-0.025	-0.030**
	(0.005)	(0.022)	(0.036)	(0.013)	(0.010)
ASO (d)	0.003	-0.024	-0.076**	-0.006	-0.014
	(0.006)	(0.017)	(0.026)	(0.014)	(0.010)
FAC/AO (d)	-0.002	-0.036	0.011	-0.035**	-0.028**
	(0.005)	(0.020)	(0.034)	(0.012)	(0.009)
Age	0.000	-0.006	-0.004	-0.005***	-0.002
	(0.000)	(0.003)	(0.003)	(0.002)	(0.001)
Female (d)	0.024	-0.003	-0.008	-0.004	0.021
	(0.019)	(0.034)	(0.070)	(0.033)	(0.032)
Married (d)	-0.001	-0.017	-0.054	-0.003	-0.014
	(0.008)	(0.026)	(0.060)	(0.023)	(0.022)
Military Spouse (d)	0.016	0.052	0.107	0.038	0.051
	(0.015)	(0.046)	(0.115)	(0.038)	(0.041)
>=2 Dependents (d)	0.019***	0.038	0.073*	0.032*	0.025*
	(0.006)	(0.023)	(0.033)	(0.015)	(0.012)
Prior Enlisted (d)	-0.004	-0.017	-0.066*	0.000	-0.006
	(0.005)	(0.016)	(0.027)	(0.015)	(0.011)
White (d)	0.004	0.024	0.025	0.031	0.015
	(0.007)	(0.022)	(0.040)	(0.018)	(0.014)
Hispanic (d)	0.004	0.016	0.037	-0.027	0.017
	(0.011)	(0.032)	(0.075)	(0.024)	(0.028)
Service Academy (d)	0.003	0.006	0.002	-0.001	-0.002
	(0.006)	(0.017)	(0.039)	(.)	(0.013)
STEM Degree (d)	0.002	-0.002	0.021	0.005	0.003
	(0.005)	(0.012)	(0.030)	(0.012)	(0.010)
Post-Bachelors (d)	-0.008	-0.023	-0.019	-0.024	-0.017
	(0.005)	(0.017)	(0.031)	(0.014)	(0.011)
Upper Third (d)	0.005	0.016	0.075	0.002	0.009
	(0.008)	(0.021)	(0.065)	(0.019)	(0.017)
More Below (d)	-0.006	-0.033	-0.066*	-0.018	-0.014
	(0.005)	(0.020)	(0.031)	(0.014)	(0.011)
Observations	6595	2403	556	2150	1810
R-squared					

Marginal effects; Standard errors in parentheses
(d) for discrete change of dummy variable from 0 to 1
* p<0.05, ** p<0.01, *** p<0.001

Table 10. In-depth VSP Characteristics Model

	(1) Overall	(2) Eligible	(3) FY2013	(4) FY2014	(5) FY2015
VSP					
AV-8B Pilot (d)	0.816	-0.015		0.906	0.813
	(30.343)	(0.010)		(13.020)	(54.858)
F/A-18 Pilot (d)	0.801	-0.001		0.908	
	(30.236)	(0.012)		(12.493)	
F/A-18 WSO (d)	0.668	-0.032***		0.812	0.835
	(43.512)	(0.006)		(22.508)	(54.726)
EA-6B Pilot (d)	0.921	0.007		0.956	
	(17.913)	(0.024)		(4.857)	
EA-6B ECMO (d)	0.763	-0.022*		0.897	0.972
	(36.911)	(0.011)		(13.818)	(12.336)
KC-130 Pilot (d)	0.728	-0.023**		0.882	0.724
	(37.726)	(0.008)		(15.642)	(69.078)
CH-46 Pilot (d)	0.887	0.037	0.131	0.946	0.956
	(21.731)	(0.024)	(11.354)	(7.813)	(19.472)
UH-1 Pilot (d)	0.792	-0.008		0.945	0.877
	(32.679)	(0.012)		(7.705)	(42.412)
CH-53 Pilot (d)	0.676	-0.024**	0.717	0.867	0.735
	(37.263)	(0.008)	(66.207)	(16.715)	(60.243)
AH-1 Pilot (d)	0.774			0.932	0.842
	(31.758)			(10.002)	(46.089)
WTI (d)	0.001	-0.003	0.009	-0.001	-0.002
	(0.060)	(0.010)	(0.394)	(0.010)	(0.029)
ASO (d)	0.002	-0.004	-0.005	-0.001	0.001
	(0.078)	(0.009)	(0.238)	(0.010)	(0.017)
FAC/AO (d)	0.002	0.002	0.014	0.000	-0.003
	(0.110)	(0.009)	(0.581)	(0.009)	(0.038)
Age	-0.000	-0.009***	-0.003	-0.006	-0.002
	(0.020)	(0.001)	(0.155)	(0.015)	(0.033)
Female (d)	0.005	0.020	-0.008	0.028	-0.001
	(0.209)	(0.028)	(0.394)	(0.073)	(0.015)
Married (d)	0.001	0.007	0.006	0.008	-0.003
	(0.055)	(0.012)	(0.271)	(0.023)	(0.046)
Military Spouse (d)	0.001	0.013	0.057	0.001	0.015
	(0.068)	(0.023)	(1.957)	(0.019)	(0.199)
>=2 Dependents (d)	0.002	0.009	-0.003	0.007	0.007
	(0.073)	(0.009)	(0.116)	(0.021)	(0.101)
Prior Enlisted (d)	-0.002	-0.020*	-0.006	-0.024	-0.007
	(0.123)	(0.009)	(0.281)	(0.063)	(0.102)
White (d)	0.001	0.011	0.006	0.012	0.006
	(0.049)	(0.012)	(0.263)	(0.035)	(0.090)
Hispanic (d)	-0.002	-0.015		-0.012	-0.002
	(0.081)	(0.014)		(0.034)	(0.036)
Service Academy (d)	-0.000	-0.006	-0.005	-0.007	-0.001
	(0.023)	(0.009)	(0.211)	(0.021)	(0.009)
STEM Degree (d)	-0.001	-0.012	0.003	-0.011	-0.001
	(0.041)	(0.007)	(0.139)	(0.029)	(.)
Post-Bachelors (d)	-0.003	-0.028***	-0.009	-0.028	-0.009
	(0.140)	(0.008)	(0.437)	(0.075)	(0.131)
Upper Third (d)	-0.000	-0.005	0.046	-0.004	-0.003
	(0.023)	(0.011)	(1.660)	(0.015)	(0.039)
More Below (d)	0.001	0.005	-0.012	0.008	0.001
	(0.047)	(0.010)	(0.590)	(0.022)	(0.011)
Observations	6595	1793	245	1699	1431
R-squared					

Marginal effects; Standard errors in parentheses
(d) for discrete change of dummy variable from 0 to 1
* p<0.05, ** p<0.01, *** p<0.001

Table 11. In-depth TERA Characteristics Model

	(1) Overall	(2) Eligible	(3) FY2013	(4) FY2014	(5) FY2015	(6) FY2016
TERA						
AV-8B Pilot (d)	0.021	-0.246	-0.039	0.060	0.038	
	(0.013)	(5.088)	(0.045)	(0.089)	(0.054)	
F/A-18 Pilot (d)	0.028*	-0.286	-0.063	0.129	0.098	-0.027
	(0.013)	(6.634)	(0.033)	(0.106)	(0.092)	(0.103)
F/A-18 WSO (d)	0.002	-0.136		0.050	0.015	
	(0.011)	(1.549)		(0.098)	(0.053)	
EA-6B Pilot (d)	0.023	-0.097		0.131	0.083	
	(0.022)	(0.578)		(0.142)	(0.118)	
EA-6B ECMO (d)	0.015	-0.125	-0.039	0.083	-0.013	
	(0.014)	(1.363)	(0.050)	(0.110)	(0.043)	
KC-130 Pilot (d)	0.022	-0.211	-0.065*	0.081	0.006	0.108
	(0.013)	(3.893)	(0.029)	(0.101)	(0.041)	(0.160)
CH-46 Pilot (d)	0.040*	-0.309	-0.051	0.113	0.050	0.175
	(0.017)	(7.450)	(0.053)	(0.107)	(0.058)	(0.150)
UH-1 Pilot (d)	0.007	-0.168	-0.075**	0.096	0.005	0.158
	(0.010)	(2.505)	(0.024)	(0.118)	(0.042)	(0.205)
CH-53 Pilot (d)	0.005	-0.407	-0.058	0.006	-0.012	
	(0.008)	(9.687)	(0.035)	(0.060)	(0.032)	
AH-1 Pilot (d)	-0.000	-0.336	-0.072**	0.012	-0.019	
	(0.007)	(7.495)	(0.027)	(0.064)	(0.030)	
WTI (d)	-0.010***	-0.052	-0.024	-0.034*	-0.029*	
	(0.003)	(0.048)	(0.029)	(0.014)	(0.014)	
ASO (d)	-0.001	-0.019	-0.042	0.008	-0.020	
	(0.004)	(0.024)	(0.025)	(0.017)	(0.013)	
FAC/AO (d)	-0.006*	-0.049	0.007	-0.040**	-0.031*	
	(0.003)	(0.045)	(0.031)	(0.013)	(0.012)	
Age	0.001***	-0.026	0.002	-0.005**	-0.002	0.002
	(0.000)	(0.022)	(0.003)	(0.002)	(0.002)	(0.007)
Female (d)	0.010	-0.038	0.024	-0.039	0.049	
	(0.013)	(0.047)	(0.085)	(0.024)	(0.055)	
Married (d)	-0.008	-0.064	-0.063	-0.028	-0.014	0.005
	(0.007)	(0.067)	(0.064)	(0.036)	(0.030)	(0.131)
Military Spouse (d)	0.008	0.030	-0.004	0.041	0.052	
	(0.011)	(0.059)	(0.080)	(0.055)	(0.057)	
>=2 Dependents (d)	0.014***	0.041	0.046	0.045**	0.032*	-0.003
	(0.004)	(0.041)	(0.033)	(0.015)	(0.015)	(0.120)
Prior Enlisted (d)	0.003	-0.053	-0.048*	0.022	0.003	-0.068
	(0.004)	(0.048)	(0.024)	(0.018)	(0.015)	(0.065)
White (d)	0.000	0.035	0.004	0.018	0.005	-0.016
	(0.005)	(0.037)	(0.039)	(0.021)	(0.021)	(0.115)
Hispanic (d)	0.007	0.055	0.071	-0.009	0.029	0.153
	(0.009)	(0.065)	(0.081)	(0.034)	(0.041)	(0.240)
Service Academy (d)	0.004	-0.014	0.043	0.009	-0.003	
	(0.004)	(0.023)	(0.045)	(0.020)	(0.017)	
STEM Degree (d)	0.003	0.003	0.018	0.020	0.001	0.130
	(0.003)	(0.017)	(0.027)	(0.015)	(0.013)	(0.099)
Post-Bachelors (d)	0.001	-0.006	0.005	0.004	-0.008	-0.048
	(0.004)	(0.018)	(0.029)	(0.017)	(0.014)	(0.064)
Upper Third (d)	0.006	0.034	0.050	0.003	0.023	
	(0.006)	(0.040)	(0.058)	(0.023)	(0.027)	
More Below (d)	-0.008*	-0.074	-0.038	-0.033*	-0.027	0.076
	(0.003)	(0.067)	(0.030)	(0.015)	(0.014)	(0.117)
Observations	6595	1185	487	1129	1048	89
R-squared						

Marginal effects; Standard errors in parentheses
(d) for discrete change of dummy variable from 0 to 1
* p<0.05, ** p<0.01, *** p<0.001

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